

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA25 | Castle Bromwich and Bromford

Construction assessment (SV-003-025)

Sound, noise and vibration

November 2013

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Department
for Transport

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Appendix SV-003-025

Environmental topic:	Sound, noise and vibration	SV
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1 Introduction

- 1.1.1 The sound, noise and vibration appendices comprise four sections. The first of these is an introduction to the relevant route-wide methodology, assumptions and assessment (Volume 5: Appendix SV-001-000). This relates to the sound, noise and vibration assessment for all community forum areas (CFA).
- 1.1.2 For the Castle Bromwich and Bromford community forum area (CFA25), the other three sections are as follows:
- baseline sound, noise and vibration (Volume 5: Appendix SV-002-025);
 - construction sound, noise and vibration (Volume 5: Appendix SV-003-025) (this appendix); and
 - operational sound, noise and vibration (Volume 5: Appendix SV-004-025).
- 1.1.3 The outcomes of the assessment are summarised in Volume 2, Castle Bromwich and Bromford (CFA Report 25), Section 11 Sound, noise and vibration.
- 1.1.4 Maps referred to throughout the sound, noise and vibration appendices are contained in the Volume 5: Map Book Sound, noise and vibration.
- 1.1.5 This appendix presents the likely noise and vibration impacts, effects and significant effects arising from the construction of the Proposed Scheme for the Castle Bromwich and Bromford area on:
- people, primarily where they live ('residential receptors') in terms a) individual dwellings and b) on a wider community basis, including any shared community open areas; and
 - community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'.
- 1.1.6 The assessment of likely impacts, effects and significant effects from construction noise and vibration on agricultural, community, ecological or heritage receptors and the assessment of tranquillity are presented in the following documents within Volume 5:
- Community data (Volume 5: Appendix: CM-001-025);
 - Ecology appendices (Volume 5: Appendix EC-001-025, EC-002-025, EC-003-025 and EC-005-004);
 - Cultural heritage: Impact assessment table (Volume 5: Appendix CH-003-025); and
 - Landscape report (Volume 5: Appendix LV-001-025).

1.2 Evaluation of impacts and effects

- 1.2.1 This appendix provides a quantitative assessment of construction noise and vibration impacts/effects and a qualitative assessment of likely significant effects, based on the impacts/effects identified and other local context information consistent with the scope and methodology defined for the Proposed Scheme.

- 1.2.2 Indirect effects arising from temporary changes in traffic patterns on the existing road network as a consequence of constructing the Proposed Scheme are also reported in this appendix, where they are likely to occur within the study area as defined in Volume 5: Appendix SV-001-000.
- 1.2.3 In undertaking the assessment of sound and vibration, consistent with Environmental Impact Assessment (EIA) Regulations (see Volume 1, Section 1.3) and emerging National Planning Practice Guidance¹ a differentiation between impacts, effects, adverse effects and significant effects is made. Further information is provided in Volume 5: Appendix SV-001-000.
- 1.2.4 The assessment of impacts and effects has been undertaken at assessment locations that are representative of a number of dwellings or other sensitive receptors. The assessment locations employed in this assessment are presented on Map series Sv-03 in Volume 5: Map book Sound, noise and vibration.

¹ Information is provided in the Department for Communities and Local Government's emerging National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk>, (refer to the noise exposure hierarchy), as available on 14th October 2013.

2 Scope, assumptions and limitations

2.1 Regional and local policy guidance

- 2.1.1 The policy framework for sound, noise and vibration is set out in Volume 1 and in Volume 5: Appendix SV-001-000. As part of the engagement with local authorities through the Planning Forum Sub Group - Acoustics, information regarding any specific local planning guidance in respect of noise and vibration has been requested. Whilst no information has been received for this study area via the Planning Forum Sub Group - Acoustics, local policy guidance on noise and vibration has been identified in the form of The Birmingham Plan - Birmingham Unitary Development Plan – 2005.
- 2.1.2 This guidance has been considered as part of formulating the detailed application of the impact and significance criteria set out in Volume 5: Appendix SV-001-000.

2.2 Engagement

- 2.2.1 Details of engagement on a route-wide basis with the local and county authorities' Environmental Health Practitioners via the Planning Forum Sub Group - Acoustics, is set out in Volume 1.
- 2.2.2 Engagement with communities has been via the Community Forums, as set out in Volume 1. In respect of sound, noise and vibration the following discussions have taken place:
- general discussions in respect of local issues, including possible ways to avoid and mitigate the potential impacts of noise or vibration;
 - September/October 2012; a specific presentation about sound, noise and vibration with discussion afterwards with one of the project team specialists;
 - November/December 2012; specific request for the Community Forum to propose baseline sound monitoring locations;
 - January/February 2013; feedback to the Community Forum on any proposed baseline monitoring locations; and
 - verbal/written response to questions and sound, noise and vibration.

2.3 Methodology

- 2.3.1 The methodology used for the assessment of airborne sound, ground-borne sound and vibration impacts and the determination of significant effects is defined in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1), is clarified in a number of areas by the SMR addendum (Volume 5: Appendix CT-001-000/2). Further information is contained in Volume 5: Appendix SV-001-000.

2.4 Assumptions

- 2.4.1 Route-wide assumptions are outlined in Volume 1 and are further detailed in Volume 5: Appendix SV-001-000. Local assumptions that apply to the assessment of

construction sound noise and vibration within this area are set out Volume 2, Castle Bromwich and Bromford (CFA Report 25), Section 11.

2.5 **Limitations**

- 2.5.1 The route-wide limitations and the approach adopted to assure that they will not impact the robust assessment of sound, noise and vibration are presented in Volume 5: Appendix SV-001-000. No specific additional limitations are identified for this study area.

3 Environmental Baseline

Existing baseline

- 3.1.1 Baseline sound level data has been collected at locations representative of the airborne sound-sensitive receptors. The existing and future baseline airborne sound levels derived from these measurements are given in Volume 5: Appendix SV-002-025. Details of the baseline data collection and the methodology are given in Volume 5: Appendix SV-001-000 and specifically for this study area in Volume 5: Appendix SV-002-025.

Future baseline

- 3.1.2 The assessment of noise from construction activities assumes a baseline year of 2017 which represents the period immediately prior to the start of the construction period. As a reasonable worst case, it has been assumed that no change in baseline sound levels will occur between the existing baseline (2012/13) and the future baseline year of 2017. The assessment of noise from construction traffic assumes a baseline year of 2021, representative of the middle of the construction period when the construction traffic flows are expected to be at their peak. Further information can be found in the Traffic and transport assessment (Volume 5: Appendix TR-001-025).

4 Effects arising during construction

4.1 Introduction

4.1.1 The assessment is reported first for ground-borne vibration and then for airborne sound. Under each of these headings, the results of the quantitative identification of impacts and effects are presented. This is followed by the identification of significant effects and the evidence used to support these conclusions.

4.1.2 The structure of this assessment report is:

- avoidance and mitigation measures;
- quantitative identification of impact and effects:
 - ground-borne vibration:
 - residential; and
 - non-residential.
 - airborne sound:
 - residential; and
 - non-residential.
- assessment of impacts and effects:
 - residential receptors: direct effects – dwellings;
 - residential receptors: direct effects – communities;
 - residential receptors: indirect effects;
 - non-residential receptors: direct effects;
 - non-residential receptors: indirect effects; and
 - cumulative effects from the proposed scheme and other committed development.

4.2 Avoidance and mitigation measures

4.2.1 These are set out in, Volume 2, Castle Bromwich and Bromford (CFA Report 25), Section 11.


4.3 Quantitative identification of impacts and effects

Ground-borne vibration

4.3.1 Assessment locations defined for the quantitative assessment of impacts are shown on Map series SV-03 in Volume 5: Map Book Sound, noise and vibration.

4.3.2 For each Assessment Location, the assessment results for residential and non-residential receptors are presented in Table 1: Assessment of construction induced

ground-borne vibration at residential receptors and Table 2: Assessment of construction induced ground-borne vibration at non-residential receptors respectively. Explanation of the information in Table 1 is provided in Volume 5: Appendix SV-001-000, with the following additional notes:

 Where the significant effect column is highlighted, then a significant effect is identified at the referenced community, or individual receptor

- * Significant effect – the quantitative impact methodology has identified either:
 - 1) no impact at this receptor but further information (see assessment) has identified that a significant effect is nonetheless likely; or
 - 2) an impact at this receptor which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect
- ~ Significant effect - The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000)
- A Type of effect – adverse effect
- S Type of effect – significant adverse effect
- NA Type of effect – generally no adverse effect
- B Type of effect – for non-residential receptors further detail about the type of effect is set out in the text of Volume 5: Appendix SV-001-000
- R Type of receptor - residential
- V1-V4 Type of receptor – (V1) vibration sensitive research and manufacturing, hospital, and university equipment, (V2) hotels, hospital wards and education dormitories, (V3) offices, schools and places of worship, (V4) workshops
- T Receptor design – typical
- S Receptor design - special

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Table 1: Assessment of construction induced ground-borne vibration at residential receptors

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Peak particle velocity (PPV) [mm/s] on foundation	Typical/highest monthly indoor vibration dose value (VDV) [m/s ^{-1.75}]		Construction activity resulting in highest forecast vibration levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
93521	Blenheim Way, Castle Vale, Birmingham	0.22	0.09/0.09	-	Earthworks	NA	16	R	T	-	-	N	-	-	
75260	Bromford Road, Birmingham	0.14	0.07/0.07	-	Depot earthworks fill	NA	12	R	T	-	-	N	-	-	

Table 2: Assessment of construction induced ground-borne vibration at non-residential receptors

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Peak particle velocity (PPV) [mm/s] on foundation	Typical/highest monthly indoor vibration dose value (VDV) [m/s ^{-1.75}]		Construction activity resulting in highest forecast vibration levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
			Day 0700-2300	Night 2300-0700											
136721	Twisted Oak Stables, B4118 Birmingham Road, Birmingham	0.85	0.16/0.16	-	Earthworks	B	1	V3	T	-	-	N	-	-	

Airborne sound: direct impacts and effects

4.3.3 Activities associated with the construction phases of the Proposed Scheme will generate airborne noise. The assessment of the likely impacts and significant effects as a result of the construction noise has considered the effects on:

- residential receptors, both as individual dwellings and communities; and
- non-residential receptors, including quiet areas.

For each type of receptor, subject to the screening distances identified, and based upon supplied plant information from engineers, the typical and highest monthly $L_{Aeq,T}$ noise levels from construction activities have been calculated at the façade of all assessment locations, which are representative of a number of receptors in the study area.

4.3.4 The assessment results, impact criteria and significance criteria for the assessment of the scheme at residential and non-residential receptors are presented in Table 3 and Table 4 respectively.

4.3.5 Explanation of the information within Table 3 and Table 4 is provided in Volume 5: Appendix SV-001-000, with the following additional notes:

	Where the significant effect column is highlighted, then a significant effect is identified at the referenced community, or individual receptor
*	Significant effect – the quantitative impact methodology has identified either: <ol style="list-style-type: none"> 1) no impact at this receptor but further information (see assessment) has identified that a significant effect is nonetheless likely; or 2) an impact at this receptor which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect
~	Significant effect - The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000)
A	Type of effect – adverse effect
S	Type of effect – significant adverse effect
NA	Type of effect – generally no adverse effect
B	Type of effect – for non-residential receptors further detail about the type of effect is set out in the text of Appendix SV-001-000
R	Type of receptor - residential
G	Type of receptor - (G1) theatres, large auditoria and concert halls, (G2) sound recording and broadcast studios, (G3) places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (G4) schools, colleges, hospitals, hotels and libraries, and (G5) offices and general commercial premises
T	Receptor design – typical
S	Receptor design - special

H	Existing environment – high existing ambient noise levels, day >75 dB, evening >65 dB or night >55 dB L_{pAeq} at the facade
L	Existing environment – low existing ambient noise levels, day and evening ≤ 45 dB, or night ≤ 35 dB L_{pAeq} at the facade
D,E,N	Impact duration (months) – duration of impact during the day (D), evening (E) or night (N)
NI	Mitigation effect - identified as likely to qualify for noise insulation under the draft CoCP
BT	Bromford tunnel

Table 3: Assessment of construction noise at residential receptors

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
73644	York Drive, Birmingham	53/59 [C]	<40/44 [C]	36/44 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	8	R	T	H	-	N	-	-	
73663	Bromford Drive, Birmingham	54/59 [C]	<40/45 [C]	38/45 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	23	R	T	H	-	N	-	-	
73708	Newmarket Way, Birmingham	52/58 [B]	<40/44 [C]	36/44 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	21	R	T	H	-	N	-	-	
74835	Farnhurst Road, Birmingham	59/64 [C]	44/49 [C]	44/49 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	19	R	T	H	-	N	-	-	
74965	Farnhurst Road,	54/60	41/45 [C]	40/45	Day: Washwood Heath depot buildings	NA	36	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
	Birmingham	[C]		[C]	substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection										
75034	Fairholme Road, Birmingham	56/62 [C]	43/48 [C]	42/48 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	49	R	T	H	-	N	-	-	
75260	Bromford Road, Birmingham	60/65 [B]	44/50 [C]	43/50 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	12	R	T	H	-	N	-	-	
75421	Farnhurst Road, Birmingham	55/61 [C]	42/46 [C]	42/46 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	26	R	T	H	-	N	-	-	
76387	Peak Croft, Birmingham	48/52 [A]	-	-	Day: utility diversions	NA	62	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
76711	Kempton Park Road, Birmingham	46/49 [B]	-	-	Day: utility diversions	NA	43	R	T	H	-	N	-	-	
76777	Bromford Drive, Birmingham	43/55 [C]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT west portal tunnel finishes; Night: install railway protection barrier	NA	116	R	T	H	-	N	-	-	
76821	Sundew Croft, Birmingham	43/56 [C]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT west portal tunnel finishes; Night: BT west portal tunnel finishes	NA	40	R	T	H	-	N	-	-	
76985	Goodwood Close, Birmingham	47/49 [C]	-	-	Day: utility diversions	NA	95	R	T	H	-	N	-	-	
77075	Cheltenham Drive, Birmingham	52/57 [A]	-	-	Day: utility diversions	NA	50	R	T	H	-	N	-	-	
77112	Sandown Road, Birmingham	55/61 [B]	-	-	Day: utility diversions	NA	42	R	T	H	-	N	-	-	
77186	Ayrshire Close, Birmingham	47/50 [B]	-	-	Day: utility diversions	NA	29	R	T	H	-	N	-	-	
77246	Ayrshire Close, Birmingham	57/64 [B]	-	-	Day: utility diversions	NA	24	R	T	H	-	N	-	-	
77296	Chillinghome Road, Birmingham	61/65 [B]	-	-	Day: utility diversions	NA	5	R	T	H	-	N	-	-	
77300	Chillinghome Road, Birmingham	61/66 [B]	-	-	Day: utility diversions	NA	4	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria										Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect		
		Day 0700-1900	Evening 1900-2300	Night 2300-0700												
77337	Chillinghome Road, Birmingham	61/65 [B]	-	-	Day: utility diversions	NA	12	R	T	H	-	N	-	-		
77379	Chillinghome Road, Birmingham	62/68 [B]	-	-	Day: utility diversions	NA	8	R	T	H	-	N	-	-		
77460	Towcester Croft, Birmingham	49/52 [A]	-	-	Day: utility diversions	NA	28	R	T	H	-	N	-	-		
77625	Bromford Drive, Birmingham	52/59 [C]	<40/45 [C]	36/45 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	9	R	T	H	-	N	-	-		
77640	Bromford Drive, Birmingham	52/61 [C]	<40/45 [C]	36/45 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	10	R	T	H	-	N	-	-		
77652	Bromford Drive, Birmingham	50/58 [C]	<40/41 [C]	35/41 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	10	R	T	H	-	N	-	-		

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
77677	Haydock Close, Birmingham	46/55 [B]	<40/40 [C]	<35/40 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	21	R	T	H	-	N	-	-	
77728	Bromford Drive, Birmingham	<40/41 [C]	<40/<40 [C]	<35/<35 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	21	R	T	H	-	N	-	-	
77747	Bromford Drive, Birmingham	41/50 [C]	<40/<40 [C]	<35/<35 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	5	R	T	H	-	N	-	-	
77756	Haydock Close, Birmingham	47/54 [B]	<40/<40 [C]	<35/39 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	20	R	T	H	-	N	-	-	
77841	Bromford Drive, Birmingham	40/48 [C]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT west portal tunnel boring machine erection;	NA	24	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
					Night: BT west portal tunnel boring machine erection										
77869	Bromford Drive, Birmingham	42/51 [C]	<40/<40 [C]	<35/36 [C]	Day: utility diversions; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	11	R	T	H	-	N	-	-	
77894	Fishpool Close, Birmingham	<40/44 [B]	<40/<40 [C]	<35/<35 [C]	Day: Washwood Heath depot filling; Eve: BT west portal tunnelling; Night: BT west portal tunnelling	NA	16	R	T	H	-	N	-	-	
77946	Doncaster Way, Birmingham	<40/49 [B]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	20	R	T	H	-	N	-	-	
77973	Wincanton Croft, Birmingham	44/51 [B]	<40/<40 [C]	<35/<35 [C]	Day: Washwood Heath depot hard landscaping; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	34	R	T	H	-	N	-	-	
78176	Reynoldstown Road, Birmingham	47/53 [B]	<40/<40 [C]	<35/35 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring	NA	36	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700- 1900	Evening 1900- 2300	Night 2300- 0700											
					machine erection										
78244	Redcar Croft, Birmingham	51/58 [B]	<40/45 [C]	37/45 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	13	R	T	H	-	N	-	-	
78267	Reynoldstown Road, Birmingham	52/59 [C]	<40/45 [C]	36/45 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	15	R	T	H	-	N	-	-	
78287	Sprig Croft, Birmingham	51/57 [B]	<40/44 [C]	36/44 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	29	R	T	H	-	N	-	-	
78392	Thirsk Croft, Birmingham	51/57 [B]	<40/44 [C]	35/44 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	48	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
78518	Tulyar Close, Birmingham	51/57 [B]	<40/43 [C]	35/43 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	21	R	T	H	-	N	-	-	
79448	Pan Croft, Birmingham	52/59 [B]	<40/44 [C]	39/44 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	31	R	T	H	-	N	-	-	
80049	Asholme Close, Birmingham	51/58 [B]	<40/42 [C]	37/42 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	28	R	T	H	-	N	-	-	
80057	Asholme Close, Birmingham	51/57 [B]	<40/42 [C]	36/42 [C]	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection; Night: BT west portal tunnel boring machine erection	NA	45	R	T	H	-	N	-	-	
80128	Riddfield Road, Birmingham	46/53 [A]	<40/<40 [C]	<35/37 [C]	Day: demolition; Eve: BT east portal tunnel finishes;	NA	69	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700- 1900	Evening 1900- 2300	Night 2300- 0700											
					Night: install railway protection barrier										
80329	Berrandale Road, Birmingham	46/54 [A]	<40/<40 [C]	<35/35 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	45	R	T	H	-	N	-	-	
80391	Kempson Road, Birmingham	43/50 [A]	<40/<40 [C]	<35/36 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	35	R	T	H	-	N	-	-	
80850	Chillinghome Road, Birmingham	64/68 [B]	-	-	Day: utility diversions	NA	7	R	T	H	-	N	-	-	
80870	Larkspur Croft, Birmingham	55/58 [A]	-	-	Day: utility diversions	NA	22	R	T	H	-	N	-	-	
80912	Kilmore Croft, Birmingham	56/62 [A]	-	-	Day: utility diversions	NA	34	R	T	H	-	N	-	-	
80941	Vanguard Close, Birmingham	45/60 [B]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	30	R	T	H	-	N	-	-	
81112	Bromford Drive, Birmingham	46/47 [B]	-	-	Day: utility diversions	NA	226	R	T	H	-	N	-	-	
81273	Riddfield Road, Birmingham	43/51 [A]	<40/<40 [C]	<35/37 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	94	R	T	H	-	N	-	-	
81349	Palmers Grove,	41/51	<40/<40	<35/<35	Day: utility diversions; Eve: BT east portal tunnel finishes;	NA	80	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
	Birmingham	[A]	[C]	[C]	Night: BT east portal tunnel finishes										
82140	Trigo Croft, Birmingham	<40/50 [A]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	33	R	T	H	-	N	-	-	
82239	Blossom Grove, Birmingham	46/49 [A]	-	-	Day: utility diversions	NA	89	R	T	H	-	N	-	-	
82276	The Scotchings, Birmingham	<40/45 [A]	<40/<40 [C]	<35/<35 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	72	R	T	H	-	N	-	-	
82402	Kilmore Croft, Birmingham	64/69 [B]	-	-	Day: utility diversions	NA	7	R	T	H	-	N	-	-	
85195	Concorde Drive, Castle Vale, Birmingham	52/58 [B]	45/47 [C]	43/47 [C]	Day: BT east portal diaphragm wall construction; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	70	R	T	H	-	N	-	-	
85666	Trident Boulevard, Castle Vale, Birmingham	52/58 [A]	<40/<40 [B]	38/45 [C]	Day: resoiling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	55	R	T	-	-	N	-	-	
85833	Javelin Avenue, Birmingham	58/66 [A]	45/47 [C]	46/52 [C]	Day: resoiling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	A	29	R	T	H	-	N	D 1	-	*

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
85858	Javelin Avenue, Birmingham	58/68 [B]	42/44 [C]	43/50 [C]	Day: resoiling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	53	R	T	H	-	N	-	-	
86180	Javelin Avenue, Birmingham	51/57 [B]	<40/<40 [C]	37/43 [C]	Day: Castle Bromwich retaining wall piling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	59	R	T	-	-	N	-	-	
86972	Avery Croft, Birmingham	47/54 [B]	42/45 [C]	39/45 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	31	R	T	H	-	N	-	-	
91251	Hawker Drive, Birmingham	49/55 [A]	<40/<40 [C]	35/38 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	40	R	T	H	-	N	-	-	
91392	Avery Croft, Birmingham	40/46 [B]	<40/<40 [C]	<35/<35 [C]	Day: BT east portal diaphragm wall construction; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	48	R	T	H	-	N	-	-	
92306	Cadbury Drive, Birmingham	57/63 [B]	51/54 [C]	51/56 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	23	R	T	H	-	N	-	-	
92381	Papyrus Way, Birmingham	46/53 [B]	<40/<40 [C]	<35/35 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	21	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
92394	Papyrus Way, Birmingham	47/54 [B]	<40/<40 [C]	35/37 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	6	R	T	H	-	N	-	-	
92423	Berrandale Road, Birmingham	47/54 [A]	42/42 [C]	38/42 [C]	Day: demolition; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	19	R	T	H	-	N	-	-	
92426	The Moors, Birmingham	49/57 [B]	<40/41 [C]	37/41 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	32	R	T	H	-	N	-	-	
92756	Chillinghome Road, Birmingham	59/71 [B]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	A	11	R	T	H	-	N	D 2	-	CSV25-Co2
92835	Wanderer Walk, Birmingham	57/72 [B]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	A	6	R	T	H	-	N	D 2	-	CSV25-Co2
92850	Bromford Drive, Birmingham	45/59 [C]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	25	R	T	H	-	N	-	-	
92871	Hyperion Road, Birmingham	46/58 [C]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	8	R	T	H	-	N	-	-	
92902	Wanderer Walk, Birmingham	58/73 [B]	<40/<40 [C]	<35/<35 [C]	Day: utility diversions; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	A	10	R	T	H	-	N	D 2	-	CSV25-Co2

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
93223	Blenheim Way, Castle Vale, Birmingham	52/60 [A]	42/44 [C]	42/48 [C]	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	45	R	T	H	-	N	-	-	
93389	Blenheim Way, Castle Vale, Birmingham	62/71 [B]	53/56 [C]	54/61 [C]	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	A	19	R	T	H	-	N	D 1	-	*
93426	Lancaster Drive, Birmingham	55/65 [A]	<40/<40 [C]	43/51 [C]	Day: resoiling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	32	R	T	H	-	N	-	-	
93431	Wellington Way, Birmingham	54/60 [A]	42/42 [C]	41/45 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	60	R	T	H	-	N	-	-	
93473	Spitfire Way, Castle Vale, Birmingham	57/65 [B]	47/48 [C]	47/53 [C]	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	22	R	T	H	-	N	-	-	
93498	Spitfire Way, Castle Vale, Birmingham	62/71 [B]	54/56 [C]	55/61 [C]	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	A	4	R	T	H	-	N	D 1	-	*
93521	Blenheim Way, Castle Vale, Birmingham	63/73 [A]	49/52 [C]	52/60 [C]	Day: resoiling; Eve: BT east portal tunnel boring machine	S	16	R	T	H	-	N	D 8; N 1	NI	CSV25-Co1

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
					dismantle; Night: install railway protection barrier										
93841	Farnborough Road, Birmingham	53/59 [B]	43/45 [C]	41/45 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	103	R	T	H	-	N	-	-	
93954	Drem Croft, Birmingham	50/56 [B]	<40/41 [C]	37/41 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	69	R	T	H	-	N	-	-	
93975	Cadbury Drive, Birmingham	60/66 [B]	54/57 [C]	54/61 [C]	Day: fencing; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	S	8	R	T	H	-	N	N 1	NI	CSV25-Co1
94017	Kenrick Croft, Birmingham	55/61 [B]	44/46 [C]	43/47 [C]	Day: BT east portal diaphragm wall breakdown; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	40	R	T	H	-	N	-	-	
94167	Clayton Walk, Birmingham	61/68 [B]	54/57 [C]	54/60 [C]	Day: resoiling; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	9	R	T	H	-	N	-	-	
94183	Beale Close, Birmingham	58/64 [C]	47/50 [C]	46/51 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	43	R	T	H	-	N	-	-	
94195	Beale Close, Birmingham	58/63 [C]	49/51 [C]	48/52 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	22	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
94261	Cadbury Drive, Birmingham	62/69 [B]	51/53 [C]	53/60 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	5	R	T	H	-	N	-	-	
94303	Jackson Walk, Birmingham	53/59 [A]	45/48 [C]	42/48 [C]	Day: BT east portal diaphragm wall breakdown; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	51	R	T	H	-	N	-	-	
94450	Howes Croft, Birmingham	57/63 [B]	46/47 [C]	44/49 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	22	R	T	H	-	N	-	-	
94486	Jackson Walk, Birmingham	62/69 [B]	49/51 [C]	53/60 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	10	R	T	H	-	N	-	-	
94499	Howes Croft, Birmingham	57/63 [A]	45/45 [C]	44/50 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	27	R	T	H	-	N	-	-	
94507	Howes Croft, Birmingham	58/64 [B]	48/49 [C]	47/53 [C]	Day: BT east portal diaphragm wall construction; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	26	R	T	H	-	N	-	-	
94528	Cadbury Drive, Birmingham	62/69 [B]	48/50 [C]	52/58 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	13	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
94813	Cadbury Drive, Birmingham	57/65 [B]	44/47 [C]	46/51 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	44	R	T	H	-	N	-	-	
94822	Spitfire Way, Castle Vale, Birmingham	62/71 [B]	51/54 [C]	54/61 [C]	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	A	10	R	T	H	-	N	D 1	-	*
95386	Kingsleigh Drive, Birmingham	56/63 [A]	43/44 [C]	42/46 [C]	Day: site clearance; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	23	R	T	H	-	N	-	-	
95601	Kingsleigh Drive, Birmingham	55/63 [A]	43/44 [C]	42/46 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	37	R	T	-	-	N	-	-	
95800	Farnborough Road, Birmingham	50/55 [B]	<40/40 [C]	37/40 [C]	Day: site clearance; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	81	R	T	H	-	N	-	-	
96062	Farnborough Road, Birmingham	51/56 [B]	<40/<40 [C]	36/42 [C]	Day: resoiling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	60	R	T	H	-	N	-	-	
97695	Hurricane Way, Birmingham	53/59 [B]	43/45 [C]	41/45 [C]	Day: BT east portal excavate; Eve: BT east portal tunnel finishes; Night: BT east portal tunnel finishes	NA	78	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
132963	Park View, Castle Bromwich, Birmingham	53/59 [B]	-	<35/<35 [C]	Day: Retaining wall construction; Night: install railway protection barrier	NA	10	R	T	H	-	N	-	-	
133047	Bentley Court, Castle Bromwich, Birmingham	49/55 [B]	-	<35/<35 [C]	Day: Retaining wall construction; Night: install railway protection barrier	NA	16	R	T	H	-	N	-	-	
133103	Blewitt Close, Birmingham	53/58 [B]	-	35/40 [C]	Day: River Tame viaduct piling; Night: install railway protection barrier	NA	25	R	T	H	-	N	-	-	
133144	Pikehorne Croft, Birmingham	51/56 [B]	-	<35/39 [C]	Day: River Tame viaduct piling; Night: install railway protection barrier	NA	31	R	T	H	-	N	-	-	
133224	Chadshunt Close, Birmingham	50/55 [C]	<40/<40 [C]	<35/38 [C]	Day: Earthworks; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	31	R	T	H	-	N	-	-	
133321	Castello Drive, Birmingham	52/57 [B]	<40/<40 [C]	<35/41 [C]	Day: River Tame viaduct piling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	12	R	T	H	-	N	-	-	
133335	Blewitt Close, Birmingham	53/57 [B]	-	36/41 [C]	Day: River Tame viaduct piling; Night: install railway protection barrier	NA	11	R	T	H	-	N	-	-	
133399	Tackford Close, Birmingham	50/54 [A]	<40/<40 [C]	35/38 [C]	Day: BT east portal diaphragm wall breakdown; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	36	R	T	-	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
133485	Aspbury Croft, Birmingham	53/57 [B]	<40/<40 [C]	37/42 [C]	Day: River Tame viaduct piling; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	25	R	T	H	-	N	-	-	
133823	Castello Drive, Birmingham	49/53 [A]	<40/<40 [C]	<35/37 [C]	Day: pond earthworks; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	17	R	T	-	-	N	-	-	
133912	Parkfield Drive, Birmingham	48/51 [C]	<40/<40 [C]	<35/<35 [C]	Day: pond earthworks; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	33	R	T	H	-	N	-	-	
134409	Parkfield Drive, Birmingham	47/52 [C]	<40/<40 [C]	<35/<35 [C]	Day: Retaining wall construction; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	38	R	T	H	-	N	-	-	
134691	Faircroft Road, Birmingham	43/48 [C]	-	<35/<35 [C]	Day: topsoil strip; Night: install railway protection barrier	NA	11	R	T	H	-	N	-	-	
135106	Watchbury Close, Birmingham	54/57 [B]	<40/<40 [C]	38/42 [C]	Day: topsoil strip; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	7	R	T	H	-	N	-	-	
135208	Watchbury Close, Birmingham	54/57 [B]	<40/<40 [C]	38/42 [C]	Day: topsoil strip; Eve: BT east portal tunnel boring machine dismantle;	NA	15	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
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		Day 0700- 1900	Evening 1900- 2300	Night 2300- 0700											
					Night: install railway protection barrier										
135257	Musborough Close, Birmingham	45/50 [A]	<40/<40 [C]	<35/38 [C]	Day: retaining wall earthworks; Eve: BT east portal tunnel finishes; Night: install railway protection barrier	NA	28	R	T	-	-	N	-	-	
135276	Musborough Close, Birmingham	54/57 [B]	<40/<40 [C]	38/42 [C]	Day: topsoil strip; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	14	R	T	H	-	N	-	-	
135509	Flecknoe Close, Birmingham	53/58 [B]	<40/40 [C]	38/42 [C]	Day: site clearance; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	13	R	T	H	-	N	-	-	
135599	Crawshaws Road, Birmingham	53/58 [B]	<40/<40 [C]	38/43 [C]	Day: site clearance; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	20	R	T	H	-	N	-	-	
136729	Milesbush Avenue, Birmingham	51/56 [A]	-	<35/<35 [C]	Day: Earthworks; Night: install railway protection barrier	NA	24	R	T	-	-	N	-	-	
139350	Water Orton Road, Birmingham	49/53 [A]	-	<35/<35 [C]	Day: Bridge superstructure; Night: install railway protection barrier	NA	3	R	T	-	-	N	-	-	
139360	Milesbush Avenue, Birmingham	47/52 [A]	-	<35/<35 [C]	Day: Retaining wall construction; Night: install railway protection barrier	NA	18	R	T	-	-	N	-	-	
700520	Bromford Drive,	51/65	<40/<40	<35/<35	Day: utility diversions; Eve: BT west portal tunnel boring machine	NA	115	R	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
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		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
	Birmingham	[B]	[C]	[C]	erection; Night: BT west portal tunnel boring machine erection										
700521	Tameside Drive, Birmingham	65/74 [C]	57/60 [C]	54/60 [C]	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: BT east portal tunnel boring machine dismantle	NA	15	R	T	H	-	N	-	-	
700523	Kingsleigh Drive, Birmingham	54/61 [A]	41/42 [C]	40/43 [C]	Day: site clearance; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	12	R	T	H	-	N	-	-	
700524	Danzey Greet Road, Birmingham	53/59 [B]	40/41 [C]	38/42 [C]	Day: site clearance; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	32	R	T	H	-	N	-	-	
700525	Danzey Greet Road, Birmingham	54/60 [B]	41/43 [C]	40/44 [C]	Day: site clearance; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	NA	12	R	T	H	-	N	-	-	

Table 4: Assessment of construction noise at non-residential receptors

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700- 2300	Evening 1900- 2300	Night 2300- 0700											
66479	Hurricane Park, Heartlands Parkway, Birmingham	63/69	-	-	Day: Washwood Heath depot buildings substructure	B	3	G5	T	H	-	N	-	-	
66897	Hodge Hill Nursery, Bromford Road, Birmingham	43/51	<40/<40	-	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel finishes	B	1	G4	T	H	-	N	-	-	
67066	A4040 Bromford Lane Care Centre, Fairholme Road, Birmingham	57/64	47/49	-	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel finishes	B	1	G4	T	H	-	N	-	-	
71180	Gravelly Industrial Park, Birmingham	60/66	-	-	Day: Washwood Heath depot buildings substructure	B	28	G5	T	H	-	N	-	-	
73663	Bromford Medical Centre, Bromford Drive, Birmingham	54/59	<40/45	-	Day: Washwood Heath depot buildings substructure; Eve: BT west portal tunnel boring machine erection	B	1	G4	T	H	-	N	-	-	
74835	Local shops, A4040 Bromford Lane, Birmingham	59/64	-	-	Day: Washwood Heath depot buildings substructure	B	3	G5	T	H	-	N	-	-	
77233	Tame Valley Academy, Chillinghome Road, Birmingham	62/67	-	-	Day: utility diversions	B	3	G4	T	H	-	N	D 2	-	CSV25-No4
77246	Bromford Bridge Christian Church Centre,	57/64	-	-	Day: utility diversions	B	1	G3	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700- 2300	Evening 1900- 2300	Night 2300- 0700											
	Bromford Drive, Birmingham														
77283	Local shops and club Cameronian Croft, Bromford Drive, Birmingham	48/62	-	-	Day: utility diversions	B	4	G5	T	H	-	N	-	-	
77625	Arkle Newsagents, Bromford Drive, Birmingham	52/59	-	-	Day: Washwood Heath depot buildings substructure	B	1	G5	T	H	-	N	-	-	
79325	Hodge Hill Girls School, Bromford Road, Birmingham	42/48	<40/<40	-	Day: utility diversions; Eve: BT west portal tunnel finishes	B	2	G4	T	H	-	N	-	-	
79332	Braidwood School, Bromford Road, Birmingham	40/48	<40/<40	-	Day: utility diversions; Eve: BT west portal tunnel boring machine erection	B	1	G4	T	H	-	N	-	-	
80391	Hodge Hill Health Centre and Doctors Surgery, Dreghorn Road, Birmingham	43/50	<40/<40	-	Day: site clearance; Eve: BT east portal tunnel finishes	B	2	G4	T	H	-	N	-	-	
80391	Hitec Electrical Services, Kempson Road, Birmingham	43/50	-	-	Day: site clearance	B	1	G5	T	H	-	N	-	-	
80912	Star News shop, Chillinghome Road,	56/62	-	-	Day: utility diversions	B	1	G5	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-2300	Evening 1900-2300	Night 2300-0700											
	Birmingham														
81112	Ambridge House Community Centre, Folkestone Croft, Bromford	46/47	-	-	Day: utility diversions	B	1	G3	T	H	-	N	-	-	
82276	Bellow Alarms, Riddfield Road, Birmingham	<40/45	-	-	Day: BT east portal excavate	B	1	G5	T	H	-	N	-	-	
84527	Bromford Gate, A4040 Bromford Lane, Erdington, Birmingham	64/72	-	-	Day: Washwood Heath depot buildings substructure	B	9	G5	T	-	-	N	-	-	
86972	Brooks Newsagents, Brooks Croft, Birmingham	47/54	-	-	Day: site clearance	B	1	G5	T	H	-	N	-	-	
87502	Car Showrooms, Wingfoot Way, Erdington, Birmingham	45/58	-	-	Day: utility diversions	B	3	G5	T	H	-	N	-	-	
87609	Travelodge, Fort Parkway, Birmingham	56/59	-	-	Day: utility diversions	B	2	G4	T	H	-	N	-	-	
87767	The Fort Shopping Park, Fort Parkway, Birmingham	48/56	-	-	Day: Washwood Heath depot buildings substructure	B	15	G5	T	H	-	N	-	-	
90581	Jaguar Land Rover Limited Castle Bromwich Assembly Plant, Chester	45/52	-	-	Day: utility diversions	B	1	G5	T	H	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-2300	Evening 1900-2300	Night 2300-0700											
	Road, Birmingham														
90845	Dunlop Aircraft Tyres and Stadco, Fort Parkway, Birmingham	58/62	-	-	Day: utility diversions	B	2	G5	T	H	-	N	-	-	
92309	The Fort Industrial Park (west), Dunlop Way, Castle Vale, Birmingham	47/54	-	-	Day: site clearance	B	7	G5	T	H	-	N	-	-	
92477	Dura, Castle Bromwich Business Park (west), Tameside Drive, Castle Vale, Birmingham	46/54	-	-	Day: site clearance	B	2	G5	T	H	-	N	-	-	
92924	Heartland Power Station, Fort Parkway, Birmingham	52/58	-	-	Day: utility diversions	B	1	G5	T	H	-	N	-	-	
93954	Chivenor Junior and Infant School, Farnborough Road, Birmingham	50/56	<40/41	-	Day: BT east portal excavate; Eve: BT east portal tunnel finishes	B	2	G4	T	H	-	N	-	-	
94813	Swimming pool, Cadbury Drive, Birmingham	57/65	-	-	Day: site clearance	B	1	G5	T	H	-	N	-	-	
95488	Flogas, Castle Bromwich Business Park (east), Tameside Drive, Castle Vale, Birmingham	71/81	-	-	Day: site clearance	B	4	G5	T	H	-	N	D 10	-	CSV25-No1

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L _{pAeq} [dB] at the facade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-2300	Evening 1900-2300	Night 2300-0700											
95567	Castle Bromwich Business Park, Langley Drive, Birmingham	63/71	-	-	Day: fencing	B	9	G5	T	H	-	N	-	-	
95800	Vale Stores, Farnborough Road, Birmingham	50/55	-	-	Day: site clearance	B	1	G5	T	H	-	N	-	-	
97412	The Fort Industrial Park (east), Dunlop Way, Chester Road, Castle Vale, Birmingham	51/58	-	-	Day: demolition	B	2	G5	T	H	-	N	-	-	
131548	The Ridings Care Home, Farnborough Road, Birmingham	52/56	<40/<40	37/42	Day: topsoil strip; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	B	1	G4	T	H	-	N	-	-	
132532	Park Hall Academy, Water Orton Road, Birmingham	63/68	-	-	Day: Bridge superstructure	B	1	G4	T	H	-	N	-	-	
132672	Lanchester School, Lanchester Way, Birmingham	51/57	-	-	Day: Bridge superstructure	B	1	G4	T	H	-	N	-	-	
132691	Prologis Park Midpoint, Minworth	56/61	-	-	Day: Earthworks	B	1	G5	T	H	-	N	-	-	
136721	Twisted Oak Stables, Water Orton Road, Birmingham	68/74	-	-	Day: Utilities diversion	B	1	G5	T	-	-	N	-	-	

Assessment location		Impact criteria				Significance criteria									Significant effect
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]	Mitigation effect	
		Day 0700-2300	Evening 1900-2300	Night 2300-0700											
700522	Berwood Care Home and Air Training Corps, Cadbury Drive, Castle Vale, Birmingham	62/71	50/52	54/62	Day: demolition; Eve: BT east portal tunnel boring machine dismantle; Night: install railway protection barrier	B	2	G4	T	H	-	N	D 7	-	CSV25-No2 CSV25-No3

Airborne sound: indirect effects

- 4.3.7 Construction road traffic associated with the construction phases of the Proposed Scheme would generate airborne noise. Based upon traffic information for the Proposed Scheme, the change in traffic noise level at a reference distance of 10m from the edge of the nearside carriageway resulting from the presence of construction traffic for a given road has been predicted. Data has been provided for three representative periods during the works (quarter 4 2018, quarter 1 2019 and quarter 4 2019). The results for potentially significant road links are presented in Table 5: Assessment of construction traffic noise levels.
- 4.3.8 Explanation of the information within Table 5 is provided in Volume 5: Appendix SV-001-000, with the following additional notes:



Where the significant effect column is highlighted, then a significant effect is identified on nearby communities or individual receptors

Change values



Yellow denotes a minor impact – a change is of 3-5 dB or 1-3dB where a high existing sound level is identified



Orange denotes a moderate impact – a change is of 5-10 dB or 3-5dB where a high existing sound level is identified



Red denotes a major impact – a change is of >10 dB or >5dB where a high existing sound level is identified

Table 5: Assessment of construction traffic noise levels

Road name	Link	Future baseline sound level (dB)	Future baseline sound level + construction traffic (dB) quarter 4 2018	Future baseline sound level + construction traffic (dB) quarter 1 2019	Future baseline sound level + construction traffic (dB) quarter 4 2019	Change (dB) quarter 4 2018	Change (dB) quarter 1 2019	Change (dB) quarter 4 2019	Significant effect
		Daytime $L_{pAeq,16hr}$ 0700-23:00 free- field	Daytime $L_{pAeq,16hr}$ 0700-2300 free-field	Daytime $L_{pAeq,16hr}$ 0700-2300 free-field	Daytime $L_{pAeq,16hr}$ 0700-2300 free-field				
Tameside Drive, east of Langley Drive	1081-2001	N/A	42.0	42.4	49.6	N/A	N/A	N/A	

4.4 Assessment of significant effects

Ground-borne noise and vibration

- 4.4.1 TBMs will be used to excavate the Bromford tunnel, each tunnel drive will start from the Washwood Heath depot site and progress from west to east. Each TBM is likely to generate ground-borne noise and vibration impacts but only at receptors within a close distance of the centre line of the tunnels and only for short periods of time (a few days). Overall, the deeper the tunnel is, the lower the impact. The perceptible noise and vibration will increase as each TBM approaches and diminish as it moves away from the receptor. Vibration from TBMs will present no risk of any building damage.
- 4.4.2 The effects of vibration from TBMs on building occupants will be short term (a matter of days) and hence they are not considered to be significant. Proactive and advanced community relations in advance of each TBM passing under properties will help manage expectations and allay possible concerns over the short term presence of vibration.

Residential receptors: direct effects – individual dwellings

- 4.4.3 Taking account of the avoidance and mitigation measures 24 residential properties in Castle Vale on Cadbury Drive and Blenheim Way are forecast to experience noise levels higher than the noise insulation trigger levels as defined in the draft CoCP. For daytime construction the trigger level is 75dB² measured outdoors, or the existing ambient if this is already above this level. The equivalent night-time trigger level is 55dB³.
- 4.4.4 At properties in Castle Vale on Cadbury Drive and Blenheim Way (CSV25-Co1) the draft CoCP trigger level is predicted to be exceeded during the night-time for one month in 2017, during the installation of the railway protection barrier to the south of the properties between the Birmingham and Derby rail line and the works at Bromford tunnel eastern portal. Once the barrier is in place it will provide shielding to the properties in Castle Vale.
- 4.4.5 The mitigation measures, including noise insulation, will reduce noise inside all dwellings including those in Castle Vale such that it does not reach a level where it would significantly affect¹ residents.

Residential receptors: direct effects –communities

- 4.4.6 The avoidance and mitigation measures in this area will avoid airborne construction noise and ground-borne vibration adverse effects¹ on the majority of receptors and communities. Residual temporary noise or vibration effects that are considered significant are identified later in the rest of this section.
- 4.4.7 With regard to noise outside dwellings, the assessment of temporary effects takes account of construction noise relative to existing sound levels.

² L_{pAeq,0800-1800} measured at the facade, outdoors, or the existing ambient if this is already above this level

³ L_{pAeq,2200-0700} measured at the facade, outdoors, or the existing ambient if this is already above this level

- 4.4.8 In locations with lower existing sound levels⁴, construction noise adverse effects¹ are likely to be caused by changes to noise levels outside dwellings. These may be considered by the local community as an effect on the acoustic character of the area and hence be perceived as a change in the quality of life. These adverse effects are considered to be significant when assessed on a community basis taking account of the local context⁴ as identified in Table 6.
- 4.4.9 Vibro-compaction is likely to result in appreciable ground-borne vibration at a small number of dwellings, situated closest to the activities. These receptors will also be exposed to appreciable noise from the construction of the Proposed Scheme. The significance of the identified vibration effects has been assessed in combination with the airborne noise also identified at these receptors.
- 4.4.10 Table 6 presents a summary of the likely residual significant direct effects on residential communities. The typical and worst case construction noise levels are reported to the nearest 5dB. The number of dwellings in each community has also been rounded to the nearest 5-10 properties.

Table 6: Direct adverse effects on residential communities and shared open areas that are considered to be significant on a community basis

Significant effect number	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed approximate duration of impact and details
CSV25-Co1	Construction noise	Day and night	Castle Vale. Approximately 25 dwellings on Blenheim Way and Cadbury Drive are affected at night, of which approximately 15 dwellings on Blenheim Way are also affected during the day	Day: various works including demolition, site clearance, haul route construction, re-soiling, and Dunlop Carrier Channel culvert works with typical and highest monthly noise levels of around 65dB and 75dB ⁵ . Night: installation of the railway protection barrier at Bromford tunnel eastern portal with typical and highest noise levels of around 55 and 60dB ⁶	Day: 8 months Night: 1 month
CSV25-Co2	Construction noise	Day	Bromford. Approximately 30 dwellings on Wanderer Walk and Chillinghome Road	Utility diversions with typical and highest monthly noise levels of around 60dB and 70dB ⁵	1-2 months

- 4.4.11 At some of the closest dwellings to the Bromford Tunnel east portal works on Spitfire Way, represented by assessment locations 94822 and 93498, Blenheim Way, represented by assessment location 93389, and Javelin Avenue, represented by assessment location 85833, the duration of the predicted daytime impact is one

⁴ Further information is provided in Volume 5: Appendix SV-001-000

⁵ Daytime: equivalent continuous sound level at the facade, $L_{pAeq, 0700-1900}$

⁶ Night-time: equivalent continuous sound level at the facade, $L_{pAeq, 2300-0700}$

month and the criterion is exceeded by 1 dB. At Spitfire Way and Blenheim Way this is due to demolition works commencing in 2017. At Javelin Avenue this is due to re-soiling of the nearby haul route at the end of the works in 2020. Based on the limited magnitude and duration of the impact a significant effect at these properties is not considered to be likely.

Residential receptors: indirect effects

- 4.4.12 Significant noise effects on residential receptors arising from construction traffic are unlikely to occur in this area.
- 4.4.13 Tameside Drive will be used to access the Bromford tunnel east portal work sites. As no baseline traffic data is available for this section of Tameside Drive, within Castle Bromwich Business Park, a change in traffic noise levels cannot be estimated. However, based on the low volume of construction traffic, approximately 120 vehicles as an 18 hour weekday flow in quarter 4 2019, the low levels of predicted road traffic noise compared to existing ambient noise levels, and the industrial nature of this area, a significant effect is not considered to be likely at nearby commercial premises and the Traveller Site.

Non-residential receptors: direct effects

- 4.4.14 Significant construction noise or vibration effects have been identified on a worst case basis on the following non-residential receptors the typical and worst case noise levels are reported to the nearest 5dB:
- the closest premises in the Castle Bromwich Business Park to the Bromford tunnel east portal (CSV25-No1). Significant noise effects have been identified during the daytime with noise levels rising at times to around 80dB⁵ due to a range of construction activities at the Bromford tunnel east portal. Construction noise levels are predicted to exceed the daytime impact criterion by up to 6dB for a total of 10 months between 2017 and 2019. Typical construction noise levels are around 70dB⁵. It has been assumed that the north-west façade of the buildings facing the works are in office use;
 - Berwood Court Care Home on Cadbury Drive, Castle Vale (CSV25-No2). Significant noise effects have been identified during the daytime with noise levels rising at times to around 70 dB⁵ due to demolition and various works at the Bromford tunnel east portal. The impact criterion is predicted to be exceeded by up to 5dB for a total of seven months between 2017 and 2020. Typical construction noise levels are around 60dB⁵.
 - Air Training Corps premises on Cadbury Drive, Castle Vale (CSV25-No3). Significant noise effects have been identified during the daytime with noise levels rising at times to around 70 dB⁵ due to demolition and various works at the Bromford tunnel east portal. The impact criterion is predicted to be exceeded by up to 5dB for a total of seven months between 2017 and 2020. Typical construction noise levels are around 60dB⁵. However, the Air Training Corps building is likely to be used predominantly at evenings and weekends, therefore the effect on activities at the facility may be limited; and

- Tame Valley Academy, Bromford (CSV25-No4). Significant noise effects have been identified during the daytime with noise levels rising at times to around 65 dB⁵ due to short term utility diversions along the route of Bromford tunnel. The daytime impact criterion is predicted to be exceeded by 2dB for a maximum of two months in 2017. No construction works, other than utility diversion works, are proposed in this area.

Non-residential receptors: indirect effects

- 4.4.15 Significant noise effects on non-residential receptors arising from construction traffic are unlikely to occur in this area.
- 4.4.16 Tameside Drive will be used to access the Bromford tunnel eastern portal work sites. As no baseline traffic data is available for this section of Tameside Drive, within Castle Bromwich Business Park, a change in traffic noise levels cannot be estimated. However, based on the low volume of construction traffic, approximately 120 vehicles as an 18 hour weekday flow in quarter 4 2019, the low levels of predicted road traffic noise compared to existing ambient noise levels, and the industrial nature of this area, a significant effect is not considered to be likely at the nearby commercial premises.

Cumulative effects from the Proposed Scheme and other committed development.

- 4.4.17 This assessment has considered the potential cumulative construction noise effects of the proposed scheme and other committed developments⁷. In this area, it is not anticipated that there will be any developments built at the same time as the Proposed Scheme and accordingly, construction noise or vibration from the Proposed Scheme is unlikely to result in any significant cumulative noise effects.

⁷ Refer to Volume 5: Appendix CT-004-000

5 **References**